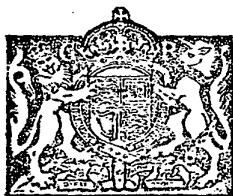


PATENT SPECIFICATION



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338,740

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Complete Accepted: Nov. 27, 1930.

COMPLETE SPECIFICATION.

Improvements in and relating to Electric Heaters for Liquid Chemical Reagents, more particularly for Lyes and Acids.

We, VEREINIGTE ALUMINIUM-WERKE AKTIENGESellschaft, of Lautawerk, (Lausitz), Germany, a German company, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The heating of liquid chemical reagents, especially of lyes and acids necessary for the carrying out of chemical processes, makes considerable demands on the apparatus employed, chiefly because the choice of suitable materials for the heating vessels, i.e. such as will withstand the action of hot reagents for a long time, is comparatively small.

The invention relates to electric heating apparatus of this kind which is free from the disadvantages of known apparatus, or has them only to a practically negligible extent.

By surrounding the container for the liquid by tubular coils communicating with the interior of the container so that the coils carry the liquid to be heated, and at the same time act as heating resistances, and arranging a return conductor lying between them, and by connecting the current supply to the middle of the length of the conductors, i.e. the pipe coils as well as the return conductor, a non-inductive action is obtained which prevents the setting up of compensating currents and detrimental electrolytic actions in the heating vessel, as well as induced magnetisation of the same, and correspondingly decreases the stresses therein.

The new apparatus is illustrated by way of example in the accompanying drawings, in which:

Figure 1 is a cross section through a part of the wall of the heating vessel, whilst,

Figure 2 is a diagram of connections for the supply of the current.

a^1 is the wall of the vessel which may be made of any suitable material and a^2 is a lining, preferably made of lead.

The heating arrangement is shaped in the form of a hollow cylinder surrounding the vessel, and consists of a supporting

construction b inside which is an insulating material g , such as Bakelite (Registered Trade Mark) or a similar substance. In this insulating material there are embedded in this form of construction two lead coils e^1, e^2 , which are coiled round the vessel. Between these runs a copper bar f serving as return conductor. There is further provided an outer covering c surrounding the vessel and heating apparatus, and between this and the support b is a suitable filling d which chiefly serves for insulating purposes, e.g. Kieselguhr.

The two ends of the lead coils, which serve for carrying the current as well as the liquid, are at the upper and lower ends connected to the interior of the vessel. The heat due to resistance causes in known manner a continual circulation of the liquid.

The three-phase electric current serving for the generation of heat is transformed in the transformer h , to two phase current e.g. down to 50 V in the present arrangement. The two phases i and k are supplied to the lead coils e^1, e^2 and the return of the sum of the two currents is effected through the copper bar f which is connected at its ends to the lead coils. All three current connections are effected in the middle of the total length of the lead coils and the copper bar. A current is thereby caused towards each of the earthed ends of each lead coil.

Through the tapping in the middle, combined with the copper return conductor, a non-inductive arrangement of winding is obtained. As a result thereof, equalising currents in the vessel are prevented and magnetisation of the vessel does not occur.

By the so-arranged direction of circulation of the liquid to be heated, a liquid coil is always connected in parallel with the metal of the lead coils. By suitably dimensioning the cross section and the length of the liquid coil, the fall of potential in the tubes is made smaller than the decomposition potential of the liquid. By this means, according to the nature of the liquid, electrolytic effects detrimental to the apparatus are completely

stopped or at least made so small as to be practically ineffective.

5 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Liquid heater, more particularly for acids and lyes, with electric resistance
10 heating, in which pipe coils surrounding a container and connected with it at their ends act as resistance elements, and as current and liquid conductors, and a return conductor is situated between the
15 pipe coils the current supply being connected at the mid-point of the length of

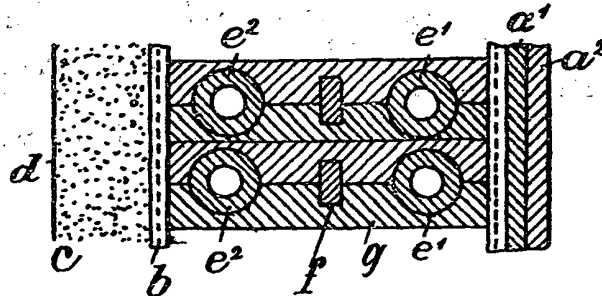
the conductors so as to obtain a non-inductive winding which prevents induced magnetisation of the heating vessel.

2. Liquid heater according to claim 1, characterised by this that the pipe coils, preferably of lead, are so dimensioned in length and cross section that when the current is flowing a fall of potential occurs which lies below the decomposition
25 potential of the acid or lye.

3. The improved liquid heater, substantially as described with reference to the accompanying drawings.

Dated this 27th day of November, 1929.
MARKS & CLERK.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1*Fig. 2*